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Hits and (near) misses: Exploring managers' actions and their effects on localised resilience.

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Abstract

Resilience is clearly a desirable attribute, but characterising it is challenging, especially as it can be understood either as the response to an incident, or its successful avoidance. Individual- and organizational-level resilience are established fields of study, whereas mid-range, managerial-level, evidence of how 'localised' resilience (e.g. in the department, work unit or project) is achieved is lacking. We ask the question 'What do managers do to support resilience?'

We report on a study carried out with senior staff from five major UK-based organizations. From our qualitative data investigating critical incidents and 'near-misses', we unpack the key (ongoing) actions that managers undertake, and show that these can be understood as a complex interweaving of exploitative and exploratory activities. We also identify five response archetypes utilised when an incident occurs. We show the simultaneity of multiple enabling and responding arrangements and, in so doing, unpack the 'messy' characteristics over time which enable the awareness and containment of potential and realised adversities, i.e. resilience.

Introduction

Organizations inevitably face adversities (Williams et al. 2017), and there is a growing appreciation that the complexity and unpredictability of the world in which they operate means that the need for resilience is increasing. As Hamel and Valikangas (2003, p.52) identified, "success has never been so fragile." This fragility means that formulaic approaches to deal with emerging challenges look less and less like tenable solutions (Fiksel et al. 2015; Maylor & Turner 2017). What this means in terms of practical managerial actions and the effects on organizational sub-units (Kahn et al., 2018), though, appears to be underexplored.

The issue of resilience was highlighted by van der Vegt et al. (2015) in Academy of Management Journal who identify the 'grand challenge' of understanding how organizations respond to adverse events, and point out that traditional risk management practices are often insufficient. As a general concept, resilience would appear to be a desirable trait, yet its nature is "nebulous" (Duit 2016, p.366). A single definition is still elusive (Annarelli & Nonino 2016; Linnenluecke 2017; Williams et al. 2017), and clear guidance for managers on how to prosper in a complex world is not yet evident, despite rising research interest (e.g. Boin & Eeten 2013; Bundy et al. 2017). Activities such as scenario planning (Nair & Sarin 1979; Ramírez & Selsky 2016) are valuable, but insufficient. In this paper we seek to understand this better and identify the range of ongoing activities that are perceived to underpin resilience, together with response options implemented by managers when adverse events actually occur. We started with the high-level question 'What do managers do to support resilience?'

Taking a broad view, the resilience literature can be taken to span from the macro level of high-reliability organizations to the individual level. However, there appears to be limited empirical work between these to identify specific, 'mid-range', managerial actions. As we discuss, there is a fundamental challenge in that resilience can be understood both as the ability to head off challenges before they impact the organization, and the capacity to recover once crises have in fact occurred. In attempting to identify and observe resilience, this presents a significant difficulty, if it can be understood both as the absence (avoidance) of issues, and the effective response to them.

We sought to identify managerial actions perceived to support 'localised' resilience at this middle level, such as the department, work unit or project. This allows a clearer understanding of particular actions with regard to a specific situation. As Kahn et al. (2018, p.510) identify, "the primary actor is not the

organization-as-a-whole but its *parts*—groups, teams, functions, departments, and hierarchical levels [emphasis in original]." However, there are a lack of empirical studies on resilience and how organizations, particularly small and medium enterprises, can achieve this (Bhamra et al. 2011). There is additionally a lack of explanation as to how resilience is built over time, so this was also a focus of our investigation.

Theoretical background: Understanding resilience

History and definitions

Much of the work on resilience originated in the field of ecology (Holling 1973) but has since been adopted within the management literature (Bhamra et al. 2011). Linnenleucke (2017) identifies the growth of resilience within the management discussion as tracing back to Staw et al. (1981) and Meyer (1982). The literature can be taken to span from the individual level, including individual psychology and its relationship with the workplace (e.g. Bonanno 2004; Calvard & Sang 2017; Coutu 2002; Crum et al. 2013; Lyons et al. 2015; Park et al. 2015; Russo 2015), to the organizational level and high-reliability organizations (e.g. Roberts & Libuser 1993; Vogus et al. 2014; Weick 1987; Weick & Roberts 1993).

There is, though, no single, unifying, definition of the term 'resilience' that is widely accepted (Linnenluecke 2017), nor clear details of managerial practices that can improve it. Bhamra et al. (2011) provide a summary of the key definitions from the multiple fields in which it has been used. From these, the following are pertinent to our discussion: Walker et al. (2004, p.2) (socio–ecological systems) describe resilience as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks"; Luthans et al. (2005, p.25) (psychology) describe it as "the ability to 'bounce back' from adversity or personal setbacks"; and Horne and Orr (1998, p.38) (organizational) say that resilience is a "fundamental quality of individuals, groups, organizations, and systems as a whole to respond productively to significant change that disrupts the expected pattern of events". Burnard et al. (2018, p.352) define resilience as "the ability to anticipate, avoid, and adjust to disruptions and changes". This captures the issues of both preparing and responding, and is the interpretation we use in this work.

Threat detection and response options

How do we understand what do managers do to achieve resilience? Williams et al. (2017) identify the acts of 'preparing' for adversity, and 'restoring' when challenges emerge, and these two aspect are explored by multiple authors. For the former, with proactive 'investment', "organizations can cultivate predisaster resilience by strengthening preventative measures, including developing networks, coordination techniques (within and between organizations), and individual members' resilience" (Williams et al. 2017, p.746). With the latter, improvisation may be required to avoid a catastrophe or minimise its impact (see also Klein et al. 2015). They categorise key aspects of resilience as including "preadversity capabilities, in-crisis organizing and adjusting, and postcrisis resilience responding" (2017, p.742). Key enablers of resilience include financial slack, cognitive capability (including strong values, timely and accurate information-sharing and problem-solving capabilities), behavioural capability in terms of both organizational design and individuals' responses (incorporating responses to 'weak signals of failure'), and relational capability including trust and effective social networks.

Annarelli and Nonino (2016) advocate 'resilience thinking' as a proactive (preparatory) approach and as a source of competitive advantage rather than as a defensive response. One of the areas of future research they identify is that of 'anticipatory innovation' which Teixera and Werther (2013) argue is valuable in creating resilience.

In terms of response, the managerial ability to react effectively to internal or external threats is also a key stream of research (Muurlink et al. 2012). Burnard et al. (2018) suggest that actions in response to a disruption are based on a combination of plans and intuition, yet they point out that this is currently poorly understood. A likely response to disruption is to reconfigure pertinent resources (e.g. Ambulkar et al. 2015), although clear-cut recommendations for this are limited. Other authors highlight the enabling conditions supporting an effective response. These include a sense of purpose, psychological safety, and accountability (Akgün & Keskin 2014; Lengnick-Hall & Beck 2005; Lengnick-Hall et al. 2011). Social capital is also identified as a way to facilitate rapid and effective coordination of resources (Ortiz-de-Mandojana & Bansal 2016; Olcott & Oliver 2014).

Burnard and Bhamra (2011) develop an organizational resilience model that looks at threat detection and response, and, importantly, incorporates learning to feed back into enhanced monitoring. In addition to the other two, this third theme, feedback, is important to understand the development of resilience,

yet is seemingly underexplored in the literature. It is not evident from this, however, what managers should do in terms of their day-to-day actions, and they recommend work that looks at the enabling conditions of organizational resilience and the dynamics of responses.

What options and practical steps are advocated? Authors recognise that potential solutions to negative events need consideration and interpretation in the particular context. Sheffi and Rice (2005) write that the ability to recover from disruption can be improved through redundancy and flexibility. The former, though, incurs costs, whereas they argue that increasing flexibility is also beneficial for day-today operations. Vargo and Seville (2011) also note that leaders and teams need to navigate the apparent contradiction of effective planning with the necessary adaptability in the moment. Denyer (2017) considers this in terms of two dimensions. The first is an axis between 'defensive' (stopping negative events) and 'progressive' (promoting positive things happening). The second axis is between consistency and flexibility. This offers four ways of thinking about organizational resilience: 'preventative control' (defensive consistency), 'mindful action' (defensive flexibility), 'performance optimization' (progressive consistency) and 'adaptive innovation' (progressive flexibility).

In recent work, Burnard et al. (2018) derive a resilience configuration matrix, with axes of *adaptation* (agile or rigid) and *preparation* (reactive or proactive). Rigid/reactive is termed 'at high risk', and vulnerable, and although agile/proactive ('resilience focused') may be perceived as more desirable, it can be highly resource intensive and therefore costly. Each quadrant has drawbacks, indicating that there is no perfect solution. Rapid, flexible responses may be welcomed, but this requires the availability of skilled individuals, which comes at a price. These arguments support the idea that there is no 'optimum' answer to be found. Trade-offs must be made, based on the situation in hand.

Challenges

The viewpoints above are valuable, and understanding resilience both in terms of the ability to prevent issues growing into crises in the first place, yet also to 'bounce back' would seem to be beneficial. A difficulty of investigating resilience is, though, as Linnenleucke (2017, p.19) highlights, that outcomes are 'invisible' if resilient firms do not experience any disruptions.

Although the resilience perspective has been used in a range of contexts, as yet there does not seem to be a general set of principles that can be advocated. Linnenleucke (2017, p.26) argues that 'organizing for resilience' is still poorly understood, and asks "What capacities bring about resilience really? And

how do they originate? How do certain capacities (i.e. resources, structures, processes) lead to resilience, and what is their relative importance?" Williams et al. (2017, p.752) also write that "[f]uture research can make a substantial contribution to the literature by exploring the role of leadership in preparing for, adjusting to, and responding to adversity as well as building endowments in a way that promotes greater resilience, thereby avoiding a triggering event and the need for crisis management." It is therefore clear that identifying and growing a resilience capability is particularly challenging.

Areas to address

In summary, resilience is a multifaceted concept that appears to be desirable. However, much of the work has been at the organizational level and there is a dearth of research that looks at managerial actions and responses that are perceived to be effective in promoting resilience. Two issues stand out as being important in this respect. First, there is a lack of clarity as to how resilience may be identified, especially when it may be signified by smooth organizational performance, and what this capability 'looks like' in practice. What are the preparation and response activities that are deemed useful? Second, it is not clear how managers identify and implement appropriate responses. Any form of containment should be attempted based on sufficient situational awareness, yet this also draws from previous experience and expectations of likely outcomes. What is the role of learning and feedback in developing resilience? Hussenot and Missonier (2016) build on the logic of 'prehension', which means that that "actors always define and act in their actual event through their engagement with past, present and anticipated events" (2016, p.525). This is a more insightful view of the temporal perspective and we return to this aspect later.

Theoretical analysis lens – exploitation and exploration

In seeking an appropriate lens through which to analyse managerial actions, we follow Van der Vegt et al. (2015) who identify that although mechanistic systems are sufficient in stable environments, changing environments require a more organic approach. To accommodate the analysis of this, we draw on March's (1991) idea of differentiating between exploitation and exploration. Sometimes risks are identified or unanticipated issues arise for which there is a recognised solution. Here an exploitative response is appropriate, such as implementing a contingency plan or adapting a previously-used technique. Alternatively, a wholly new and unexpected challenge may be faced, in which case an

innovative, exploratory, solution may be called for. The resilience literature indicates that the lens of exploitation and exploration may have utility, yet it is not clear how these interact, nor how the effect of specific stimuli such as critical incidents may cause a transition in operation. We posit that looking at exploitative and exploratory actions can be valuable in understanding better how resilience is enacted by managers.

The ambidexterity literature shows that exploitation and exploration are two opposing requirements which need to be accommodated (Ahn et al. 2006; Andriopoulos & Lewis 2010; Turner et al. 2013). This is challenging, yet the rewards for organizations which can achieve ambidexterity are financial and other performance benefits (see Birkinshaw & Gupta 2013; Junni et al. 2013; O'Reilly & Tushman 2013; Turner et al. 2013 for reviews). High-level recommendations are to separate exploitation and exploration sequentially over time (temporal ambidexterity, Tushman & O'Reilly 1996), across different business units (structural ambidexterity, O'Reilly & Tushman 2004), or via personal judgement according to the task (contextual ambidexterity, Gibson & Birkinshaw 2004).

A theme within the current literature is how the simultaneous pursuit of both exploitation and exploration actually occurs in day-to-day activity, and at different organizational levels (e.g. Kassotaki et al. 2019; Knight & Paroutis 2017; Papachroni et al. 2016; Swart et al. 2019; Turner et al. 2016), making it pertinent for our study. Much of the literature takes a rather 'static' approach, though, and does not easily accommodate the complexity of dynamic environments. Mathias et al. (2018) recommend that scholars should seek a better understanding of "the managerial mechanisms underlying the decision to adapt the balance of exploration and exploitation over time" (p.330), and that "work could also extend these findings to identify what events trigger firms to begin or change an ambidextrous strategy" (p.331).

Given that all organizations encounter challenges as part of their operations, it would appear sensible that they both exploit previous actions and explore new solutions. However, what those resilience actions look like, and how the dynamics may operate, is not apparent.

Links in the literature between ambidexterity and resilience as yet appear limited. We appreciate that these are distinct and separate constructs, and it is not our intention to link these two formally, merely to use exploitation and exploration as lenses in our analysis. However, Mamouni-Limnios et al. (2014)

support the idea that the ability both to exploit and explore should facilitate resilience. We argue that the lens is valuable in understanding 'what managers do' in preparing for and responding to events.

Research Methods

We sought to understand better what managers actually do when faced with challenges, and their perceptions with regard to the link between their actions and localised resilience within their control. Our research question was *'What do managers do to support resilience?'*

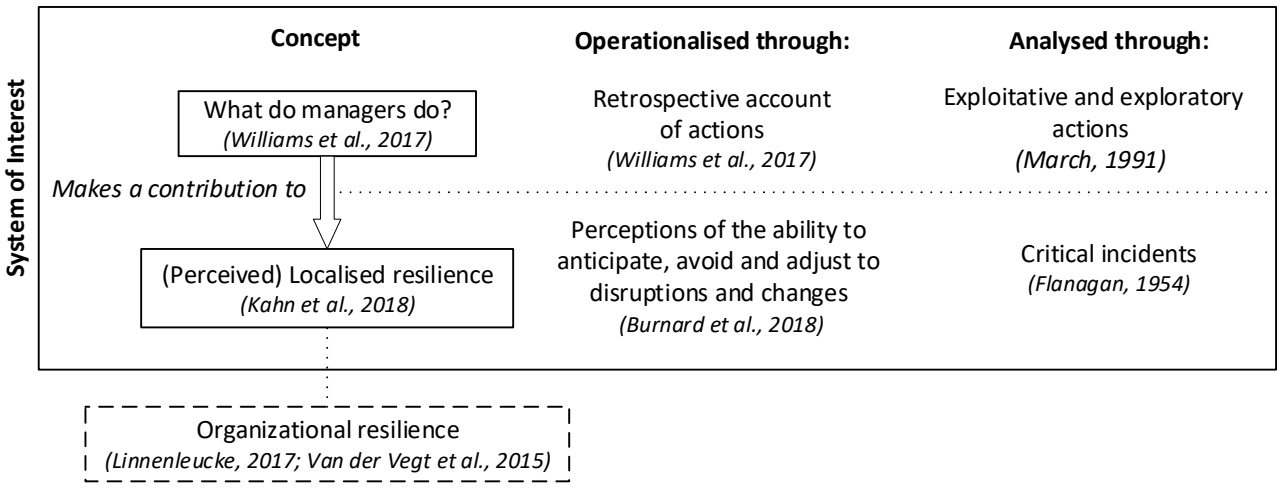

Figure 1: Overview of analysis

As shown in Figure 1, we sought to investigate managerial actions and their links with perceived localised resilience. Given the established difficulty of identifying the existence of resilience, and its nature, we chose to take a qualitative, subjective, assessment. This relies on the interpretation and opinions of knowledgeable, experienced, practitioners. We build on the work of Maylor and Turner (2017) who take this approach when looking at complexity. They use a subjective approach to investigate the 'lived experience' (Williams 2005) of managers. The use of managerial perceptions of complexity is established within that literature, in line with the rationale of Cicmil et al. (2009), Geraldi et al., (2011), Maylor et al. (2013), Shenhar and Holzmann (2017) and Turner et al. (2018) This enables a far more detailed and nuanced analysis of how managers understand and respond to complexities in their work. We take a similar approach in this study, drawing on the judgement of the managers and

their perceptions of the 'messy' (Ackoff 1979) situations they encounter. The lens we looked to use in the analysis was that of ambidexterity, to understand the exploitative and exploratory actions undertaken.

Empirical study

This study involved senior staff in five major UK-based organizations in a range of sectors to identify different challenges. A precursor to involvement in the study was that each organization was perceived internally by its senior management to be resilient, and shown to have a successful track record of performance in its own industry compared to its competitors using key, appropriate, performance metrics. They were all involved in a study to understand the nature of resilience and accepted the difficulty of investigating a subject that can be characterised by both the existence and non-existence of issues. To preserve anonymity they will be referred to by their pseudonyms.

'EngineCo' is a UK-based designer and manufacturer of vehicle power systems, with customers world-wide. 'InsureCo1' is the UK arm of large US-based insurance company serving customers in over 100 countries. InsureCo2 is the UK arm of a major European insurer with a similarly broad spread of customers in over 180 countries. 'ElectricityCo' is a UK-based power station and energy retail group. The smallest organization was ProdDevCo which is a research company executing a set of high-tech R&D projects for their clients. Indicative staff figures are given in Table 1, along with example incidents discussed.

Company	**Approx. number of staff**	**Example Incidents Encountered**
EngineCo	50,000	Delays with a major software upgrade risking design and production delays and having to be rolled back to a previous version. Resulted in escalation to senior management and much coordination at multiple levels to minimise the impact on the organization.
InsureCo1	56,000	

InsureCo2	53,000	Major insurance issues (e.g. earthquakes, hurricanes) requiring specialist 'tiger teams' of staff to be moved to support for a period of time.
ElectricityCo	2,500	Preventing / resolving faults in the power station and avoiding power outages to customers. Required significant expertise and empowerment of technical staff to make decisions rapidly.
ProdDevCo	300	Numerous advanced technical development projects for customers in a range of fields. Initial plans were often necessarily uncertain meaning that change was expected and success depended on resolving issues swiftly, and effective liaison with clients.

Table 1: Case Organizations

We chose a qualitative approach because of the richness of data and the valuable insight that can be gained from such an approach (Soltani et al. 2014). We carried out a range of interviews both with senior-(including board-level) and middle-management (see Table 2), to understand the managers' view of resilience, and the factors that they considered important in their roles. We included critical incident analysis (Flanagan 1954) to understand how managers viewed and interpreted specific events. However, we defined critical incidents as including 'near misses', to investigate events that did not themselves result in major injury, damage or failure, but which interviewees believed, based on their experience and judgement, had the potential to do so. We additionally included events that required the organization to 'bounce back'. We also discussed the wider nature of resilience and the avoidance of issues, although, unlike critical incidents, events that were avoided necessarily cannot be observed. The process did not explicitly incorporate the ideas of exploitation or exploration, the ambidexterity lens was intended only as a basis for analysing the data subsequently (e.g. Turner et al. 2016). The interviews were face-to-face and all were recorded and fully transcribed for analysis in NVivo.

Firm	Number of interviews	Example Job Titles
EngineCo	17	Programme Manager, Programme Lead, Project Manager, Solution Architect, Account Manager, Programme Management Director.
InsureCo1	14	UK Managing Director, UK CFO, CEO (EMEA), Chief Risk Officer, UK Head of Legal
InsureCo2	8	CEO (UK), Chief Risk Officer, CEO (Division), Head of Sales, Chief Actuary.
ElectricityCo	9	Head of Risk and Corporate Finance, SVP Corporate Development, Engineering and Safety Manager, Operations Director, Director of Corporate Affairs, Head of Development.
ProdDevCo	9	Chairman, CFO, CEO, Project Manager

Table 2: Interviews for the study.

Critical incidents, along with any build-up and subsequent ramifications, were researched retrospectively, together with a wider discussion of day-to-day operations. The initial step was to provide an overview of the event from the perspective of each interviewee. We asked the respondents to provide their account, including their estimate of potential impact and the likely implications. In order to provide a holistic picture about how events were managed, we asked people throughout the hierarchy of each organization to provide their view on the critical incident in order to gain multiple opinions. We wanted to understand whether, and how, risks were identified and responded to. We sought to extract the underlying managerial actions – what do those involved in these day-to-day activities actually do under these circumstances?

The analysis was performed in two stages. For the first, to understand 'what managers do', we drew upon on the methodology of Corley and Gioia (2004) to enable a more rigorous and transparent analysis for the qualitative data, as this is a key challenge for interpretive research (e.g. van Maanen 1979).This was refined in subsequent papers and described in detail by Gioia et al. (2013). It provides a structured method for deriving themes from data, and the characteristic three-stage analysis scheme (as used in Figure 2, shown shortly) has been used recently in a wide range of studies in major journals including Academy of Management Review (Ben-Menahem et al. 2016; Byron & Laurence 2015; Huy et al. 2014; Neeley & Dumas 2016; Schabram & Maitlis 2017; Smith 2015; Sonenshein 2014; Strike & Rerup 2016), Organization Studies (Calabretta et al. 2017; Delacour & Leca 2017; Moisander et al. 2016; Müller 2017; Überbacher et al. 2015), Human Relations (Dy et al. 2017; Mühlhaus & Bouwmeester

2016; Zikic & Richardson 2016) and Administrative Science Quarterly (Lawrence & Dover 2015; Vuori & Huy 2016).

The 'Gioia Method' relies on the interviewees being 'knowledgeable agents' who can articulate their thoughts, intentions, and actions. The first stage of the analysis was the '1st-order' coding of the data. This relied on "informant-centric terms and codes" (Gioia et al. 2013, p.18), i.e. coding using the respondents' words and phrases as much as possible, with limited interpretation at this stage. This is akin to Strauss and Corbin's (1998) process of 'open coding'. The next stage was to identify the '2nd-order' themes. These relied on "researcher-centric concepts, themes, and dimensions" (Gioia et al. 2013, p.18). We collected the 1st-order concepts into these clearer themes where similarities were evident, a process in lines with Strauss and Corbin's (1998) 'axial coding'. We can then use these to identify high-level 'aggregate dimensions' which we present in the following section. As we describe in detail, some aspects of the data could be coded in multiple categories, and this parallel-coding (King 2004) gave us further insight into the nature of resilience.

Acknowledging that different organizations face different challenges, for the second stage of analysis, we looked to compare the incidents they discussed to see if we could identify (1) any overarching themes and, (2) whether high-level differences between them in the responses implemented could be identified. For the cross-case analysis, we wrote up each of the cases and used case-to-case comparison to identify high-level themes in the managerial actions. From this we discerned five separate response archetypes in terms of exploitation and exploration.

Findings

Overview

The coding results, in line with Gioia et al. (2013), are shown in Figure 2. The initial analysis of the transcripts produced over 150 different codes, based on the language the respondents used. We combined them where the meaning was sufficiently similar, and these are shown in the '1st-Order Concepts'. We then grouped these into appropriate themes, reviewing the context of the coding where necessary to ensure consistency. These signified the actions represented by the concepts. We also identified each set of first-order concepts as primarily exploitative, exploratory, both, or neither. We

subsequently aggregated these 2nd-order concepts into three aggregate dimensions, namely 'Preparing', 'Noticing and Interpreting' and 'Determining Potential Responses'. This involved repeated interrogation of the data and iterating between the analysis and the transcript data (Eisenhardt & Graebner 2007) to establish the context of the 1st-order concepts to confirm that the themes were in line with the respondents' meaning and to ensure that our subsequent groupings were justified. Two of the authors developed and agreed this coding scheme through repeated analysis of the transcripts.

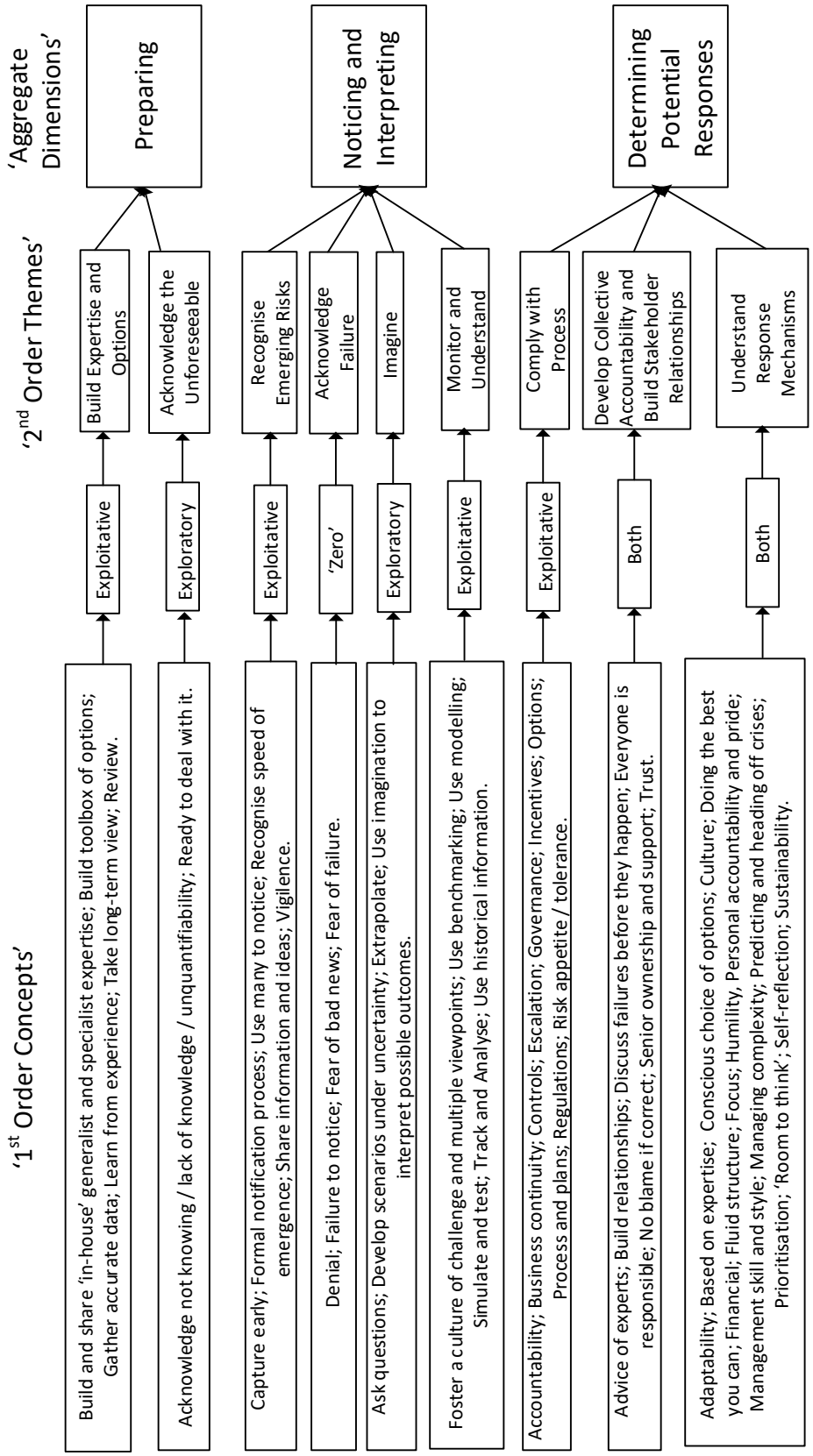

Figure 2: Results of coding using the Gioia method

The three aggregate dimensions of resilience

We now discuss the resilience results in detail and address the complex nature of the inter-relationship between the themes that we identified. In terms of our analysis lens, that of ambidexterity, it rapidly became apparent that exploitation was used in terms of the knowledge and experience from which informed decisions were made, yet this was augmented with an exploratory approach since context-specific novelties precluded the mere re-use of previous solutions. Novelty and uncertainty indeed led to exploratory activities. This established the existence of ambidexterity – the combination of both exploitation and exploration – although a clear delineation between the two was not always apparent. Although theoretically they may be considered as polar opposites, in practice and while coding the detailed data they could be hard to disentangle (see also Turner & Lee-Kelley 2013).

'Preparing'

The 'Preparing' aspect of resilience, the first of the three aggregate dimensions, involved building the ability and expertise to address risks effectively, and also the mechanisms to share that through formal and informal means. Respondents additionally discussed the long-term nature of some decision-making, acknowledging that some aspects are not knowable in advance, and that accepting this was important. The most highly coded theme (i.e. the highest scoring / most frequently referred to) was that of building expertise.

> "We've got various people who have been in leading Finance Director or risk positions and so on, one of the ways we do this I guess is we appoint very senior people onto our board and then we put them through training as well." [InsureCo2 i/v 3].

The next highest scoring concept was that of 'Long-term view', emphasising the actions that are focused on the future as well as the present.

> "People will get overloaded, that's a natural process. So in the light times, that's an opportunity to do some more longer-term things or learning things, and so on… So we focus very much on feeding the pipeline, keeping it going and being responsive." [ProdDevCo, i/v 5]

The acknowledgement of not knowing was an interesting aspect, with some individuals fully aware of the challenges they faced, but taking a pragmatic view of the issue:

> "Sometimes you've got to hold your hands up and say, yes, it was the wrong thing to do, and in my experience from my time at [Company] generally they'll say 'Right, that's fine as long as you understand what went wrong and what you should have done', and that's as far as it goes. I think the only time it would go further than that, if we did something completely stupid." [ElectricityCo, i/v 6]

As part of the development of resilience, 'Preparing' involves generating both expertise and options, together with the ability to deploy and exploit these.

'Noticing and Interpreting'

The 'Noticing and Interpreting' of risks highlighted that the organizations used a variety of methods to identify and understand risk better. This involved using language and numbers to convey both qualitatively and quantitatively what risks mean. It is valuable to treat small on-going failures as indicators of potential systemic risk and a possible precursor to a gradual breakdown of performance. Of great importance is to recognise emerging risks early and to communicate these. Actions involved: imagining (thinking in extremes, e.g. through the use of scenario planning), and monitoring and understanding (including actively finding out more, and using quantitative analysis and simulations). From the data, the theme of 'Monitor and Understand' was the most coded, Within this, 'Track and analyse' scored highest, closely followed by 'Use modelling' and 'Simulate and test'.

> "We use modelling tools and other things, providing maps and providing flood plains and earthquake zones and tsunami areas, and we are able to map exposures on that. It's not perfect and it doesn't map all our exposures, but certainly we use whatever industry tools are available and they're developing and improving all the time, as you'd expect." [InsureCo1 i/v 2].

The dimension of 'Noticing and Interpreting' includes a strong exploratory mind-set, acknowledging the limitations of specific knowledge at that moment in time, in conjunction with a systematic approach to draw on existing expertise and analysis techniques. Notably, the failure to notice issues and organizational impediments to sharing concerns represent an inability either to explore or exploit, and the respondents were open about these challenges. This 'Zero' aspect as part of the 'mix' of exploitation and exploration is particularly interesting as it represents non- or poorly-functioning aspects. This indicates *ambisinisterity* ('both left hands') – the opposite of ambidexterity which considers both hands as being equally dextrous (and derives from right-handedness).

> "You can take your eye off the ball, I suppose, but I think the overriding factor is that we have an alarm system and if something goes wrong you get that alarm up and its important to act on that. Alarms have been missed, controllers have missed alarms, I have missed them. You get that many, that most, are pretty insignificant, you don't have to do anything about it, you just accept it, yes, okay, fine that's happening. It's not an issue for us, we accept it, most alarms will be like that and then perhaps towards the end of the shift you've had one of these easy quiet shifts and you look through the alarm before you're handing over to the guy who's coming on to take you off, and you think 'Oh, crikey there's an alarm there further up the page', because we get a list of alarms and they sit there. I should have done something about that." [ElectricityCo, i/v 5]

These activities were used to make sense of potential risks by interpreting how they would 'play out' in the complex work environments. Numerous scenarios could be identified, and sense-making could be aided by ensuring that different voices were heard in the discussions. Regular challenge from peers to offer alternative options was viewed as valuable if undertaken positively. Aspects such as optimism bias and the acknowledgement of uncertainty could be discussed, and opening the interpretation to a wider group (both formal and informal) and bringing in others' expertise offers a greater range of perspectives. This can aid in countering an individual's overly optimistic view. These actions continuously comprise exploitation (using systems and tools as part of business operations) and also exploration (trying new ideas and problem-solving).

> "We still have a daily plan for the [project] and that will change, absolutely. Every couple of days something will change, whether it's something we've found through our own internal testing or something that [supplier] have requested, or a [customer] request to do something different." [EngineCo i/v 15]

> "…there was also a change in the leadership environment where the top people that filled various roles in the company were much more open to chat, I can't say that strongly enough, in fact I think that the culture has gone so far as to say that if you're sitting in a meeting and you're not providing any challenge that would be looked on negatively, as opposed to 'Who's this guy causing trouble or asking questions?'" [InsureCo1 i/v 4].

These themes therefore necessarily balance a recognition of multiple possible future states, given the conditions of uncertainty at that time, yet use the combined expertise and experience of individuals to attempt to bring clarity.

'Determining Potential Responses'

The data in the 'Determining Potential Responses' dimension showed a wide range of codes. These encompassed exploitative actions including following business processes and ensuring compliance with procedures (which could be a help or a hindrance). Other themes included the benefits of collective accountability, encouraging and supporting more exploratory solutions, and wider stakeholder engagement under conditions of uncertainty. A range of issues were identified under the category of 'Understand Response Mechanisms', including aspects such as adaptability, recognition of personal accountability and pride, prioritisation, and 'Room to think'. The variety of issues indicates that responses are complex, dynamic, situated, and not amenable to 'straightforward' solutions.

> "In order for you to be successful, you have to be able to - if you want to be here for a while - you need to be resilient and you have to be able to reinvent yourself all the time, stay current." [InsureCo1, i/v 12]

> "We did have to say, are we in freefall here, or have we got a strategy? So that's, as I say, when I went to the next steering group meeting and said to my stakeholders, 'This is how I'm playing this. We have got a strategy. Are you okay for me to continue like this?' And they all said, 'Yes, get on with it.'" [EngineCo, i/v 6]

Within this dimension, nearly half of the codes were within the 'Understand Response Mechanisms' theme, and within this the highest scorers were 'Culture' followed by 'Financial'. Interestingly, the culture codings tended to emphasise qualities such as professionalism, continuous improvement, integrity, supporting learning, and customer-centric behaviours. This broadly emphasised a more exploratory approach, together with more effective exploitation. The financial aspects, in contrast, tended to emphasise the constraints of the commercial realities of the environment.

> "It's probably worth saying that we like people making mistakes. As in the honest ones… It's the culture, the Board is effectively responsible for the culture and promulgating that." [ProdDevCo, i/v 8]

> "It's interesting, last week we had a presentation from one of our senior managers who said as far as he was concerned there are three things that are important for a project manager - it's finance, finance and finance." [EngineCo i/v 16]

'Determining Potential Responses' encompasses a wide range of exploitative organizational systems, built and refined over time, together with in-the-moment adaptations based on individual judgement and sanctioned within the organization. Contextual ambidexterity is therefore implicit in the nature of the work within each of the case organizations and shown in all three aggregate dimensions. This is also evident in the respondents' quotes above.

Relationship between the aggregate dimensions

In terms of the relative weightings of the coding, just over half were 'Determining Potential Responses', just over a third were 'Noticing and Interpreting', with the remainder classified as 'Preparing'. We cannot claim that these weights represent their relative importance, but the distribution within the interviews is nonetheless interesting and, we believe, instructive. The emphasis is primarily on awareness (noticing) and containment (responding). However, in attempting to understand better how this is enacted in practice, we identified that a 'simple' model is inappropriate. The lived reality of the managers did not follow a linear progression of *Preparing – Noticing and Interpreting – Determining Potential Responses*. Although much of the analysis was categorised according to the structure shown, some of the quotes could be coded within more than one of the first-order concepts. This multiple categorisation indicated, furthermore, that a minority of issues could be categorised in more than one second-order theme, and indeed in several aggregate dimensions, rather than representing a single idea only. Through this parallel-coding (King 2004), also known as simultaneous coding (Saldaña 2013), we identified that the three aggregate dimensions were, to some extent, interwoven, rather than separate. This form of analysis is not explicitly shown in the Gioia et al. (2013) paper, but such parallel-coding has been used within qualitative ambidexterity studies (e.g. Turner et al. 2016). For example, the following section was coded as 'Simulate and test' and 'Develop scenarios under uncertainty' (Noticing and Interpreting), as well as 'Conscious choice of options' (Determining Potential Responses):

> "You do it [testing] on the basis of the test packs that you have in place, you test the conditions that you find, any negative conditions that you find you make a decision as to whether or not

> you need to address them, and you undertake testing to ensure that the level of risk that you take with you when you finally do go live, is supportable." [EngineCo, i/v 17]

The following extract was coded as 'Acknowledge not knowing' (Preparing), 'Foster a culture of challenge and multiple viewpoints' (Noticing and Interpreting) and 'Advice of experts' (Determining Potential Responses), thereby encompassing all three dimensions:

> "You're not showing sign of weakness by saying 'I don't know how to deal with this' or 'I've never seen this before', I think sometimes perhaps from the outside we could seem like an aggressive group of people in terms of the way that if you're a fly on the wall in a meeting we'd regularly challenge each other technically and what's the right things to do on how we're managing things, or whatever it might be, so there's a lot of that going on, but it's positive, really, because we want to be able to really look at it from every angle so we're not too proud to think that we know best… the first thing to do is go and talk to people that have had experience of that, so 'What would you do in this situation?' You might collect a few opinions, sometimes it might be that you want to pull in someone who's had nothing to do with the project and is just an independent, 'Can you come and have a look?'" [ProdDevCo, i/v 3]

We therefore argue that although the three identified aggregate dimensions are conceptually separate, they cannot exist in isolation, and detailed coding revealed this. Actions cannot be undertaken without prior preparation, and the interweaving of Preparing, Noticing and Interpreting, and Determining Potential Responses in a complex environment is also logical. The coding data show that this is in fact the case, and a linear, sequential, interpretation of the three parts would represent an incomplete understanding.

This indicates the complexity of understanding the nature of resilience. As mentioned, Williams et al. (2017) identify the acts of 'preparing' and 'restoring', and we have unpacked more detail in this investigation that uncovered not only a wide range of actions that underpin the three aggregate dimensions, but also that they are interwoven in their operation.

Cross-case analysis and response archetypes

In the second stage of analysis, we investigated whether the responses implemented by the managers in different organizations followed a characteristic pattern, or if different response archetypes could be identified. By iterating between case analysis and the transcript data (Eisenhardt & Graebner 2007), we

used cross-case pattern matching (Eisenhardt 1989; Miles & Huberman 1994, pp.172–177; Yin 2009, pp.136–141) to identify five separate response archetypes, drawing on our lens of exploitation and exploration. These are shown in Figure 3. Note that the use of the words 'exploitative' and 'exploratory' refers to the predominant mode, any actions within a complex environment will necessarily contain both if analysed in detail (Turner and Lee-Kelley, 2013).

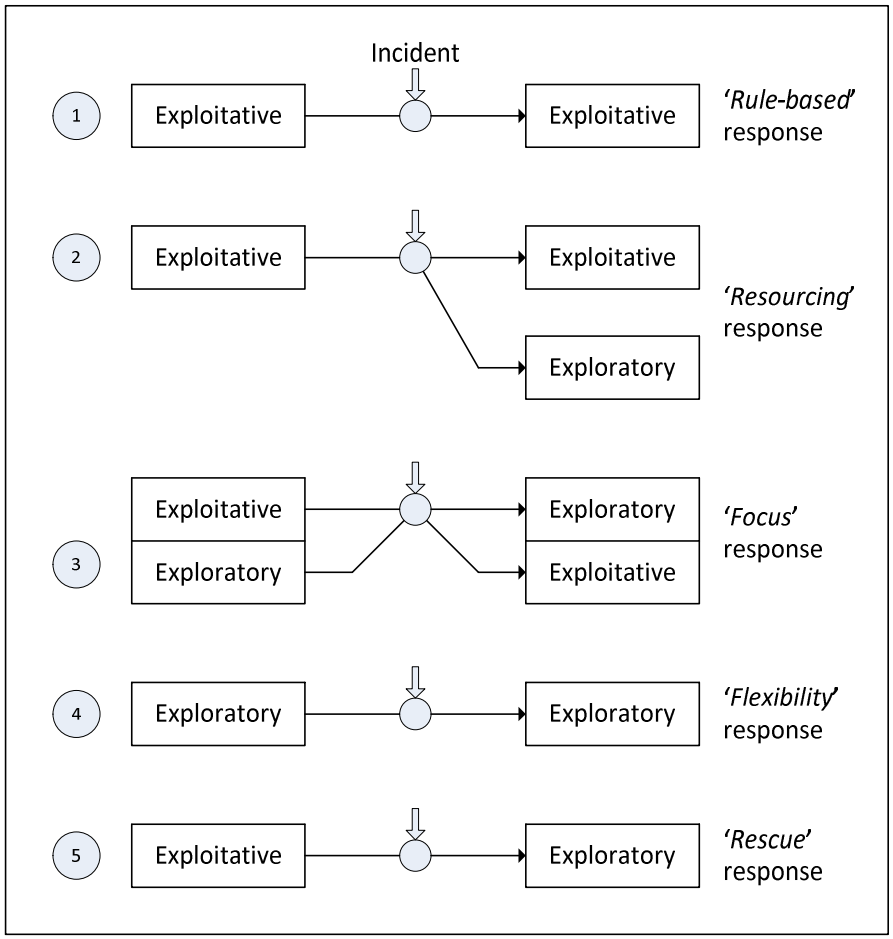

Figure 3: Five response archetypes showing the predominant orientation

'Rule-based'

The first, the 'Rule-based' archetype, is process-based and primarily exploitative, focusing on absorbing uncertainty through a pre-defined framework of actions. This relies heavily on the 'Comply with process' theme within 'Determining Potential Responses' in Figure 2. The underlying premise is that pre-loaded plans and principles can accommodate any form of disturbance. Management by exception and relying on the benefits of situated human cognition is discouraged. Within the EngineCo case, one

critical incident involved new computer-aided design and configuration software that was found to have insufficient processing capacity, potentially leading to the shutdown of a production line. Managers used their normal rules and control systems to contain the problem, implementing change requests and rolling-back the software, as well as escalating the issue to senior management and the vendors. However, these processes were unwieldy and the resolution took several weeks, leading to contested accountability and costs between the client and vendor. The eventual solutions required an 'unfreezing' of existing standards and frameworks, and this took several months. The resulting animosity also soured the relationship between client and vendor, acknowledged by both sides to be unhelpful in sustaining resilience.

> "Politically that was inconvenient for high level [client] management who had an overall programme to meet and if you moved the date even a month to the right that would mean that other things would slip back as well. And as he'd been telling his seniors the delivery day, it was kept to that. When it was escalated within [supplier] to say 'Look there is significant risk here, [client] could actually suffer dire consequences from implementing when they're not actually ready, and the data migration could be disastrous', I don't feel we actually got support." [EngineCo i/v 3].

This reliance on escalation prevented timely resolution of issues:

> "We were told to try and keep up. Internally we escalate it and let account managers' level, or above, have difficult conversations with the customer, not at PM level which you would normally do because it would take all my time arguing the toss, we wouldn't get anything done. So, you have to have someone managing the troops. and someone else having the political and commercial discussions with the customer and then I take direction from them, as it were, whether we continue, or we stop, or we only do this, or we do that. Very difficult." [EngineCo i/v5]

Such rule-based responses to shocks offer a stable, transparent environment in which additional resources can be integrated relatively easily. This is a benefit of an exploitative system. The challenge to this archetype came in the form of critical incidents for which the organization was insufficiently prepared. The inability of the managers to solve such problems with the response repertoire at hand (e.g. from engineering and project staff) led to delays and lengthy arguments about the root-causes of

incidents. EngineCo managers followed a predominantly rule-based approach, yet this contrasted with the new product development environment which, by definition, involves an element of novelty and uncertainty.

'Resourcing'

The second archetype is 'Resourcing'. In both InsureCo1 and InsureCo2, this involved the addition of temporary resources to deal with shocks until they were resolved. These included disasters such as US Hurricanes, which were unpredicted at the severity experienced. The financial impact was significant and needed careful coordination, yet managers were also required to balance their response with supporting 'business-as-usual'. Here there was a more clear-cut implementation of both exploitative and exploratory actions. The response included the rapid ad-hoc formation of 'tiger teams', consisting of cross-functional experts. They aimed to help deal with the volume of claims, including working with other insurers and dealing with the immediate litigation issues.

> "For example our US business, which is large, they have basically a response team, so when the [hurricane] struck they were out in the field the next day and had made contact either with the field inspector or over the phone to all customers that were impacted within ten days…. They wouldn't just be our resources … the guys would basically try to, or have a list of retired guys that I could activate." [InsureCo2, i/v 4]

This required a more flexible, exploratory approach from the managers concerned, which allowed others to remain focused on contributing to normal operations (i.e. exploitation). Thus we observed the managers moving from an exploitative 'day-to-day' mode to creating structurally ambidextrous project teams to accommodate both the ongoing work (exploitation) yet also being able to incorporate appropriate novel and responsive solutions to emerging difficulties (exploration). The ability to access specialist expertise was also highlighted:

> "I'll go to somebody and ask 'Who should I go to?' and keep going to people until we find who we need that has the relevant experience. And that's how we're trained and built, if I don't have the appropriate experience then I find the person and they will find the person or the resource to help us with something. We have to always know what we know, but you have to also know what you don't know, it's part of your thinking… It's a vast organization, we can work through

> it very quickly to find someone who may have dealt with it before and of course we all may wake up tomorrow and have something completely unexpected." [InsureCo1, i/v 8]

The deployment of parallel but separated exploitative and exploratory responses was perceived to have limitations. Boundaries between normal operations and responses to critical incidents became blurred. Key decision-makers could be reluctant to allow others to deal with the emergent aspects of the disturbance that had, until recently, been their remit. One of the senior leaders acknowledged that this was far from clear-cut:

> "The question is, how can you be sure in those areas that you have assessed as being non-critical that there is not a critical issue developing? How do you remain comfortable that there isn't a sore festering somewhere within the organization that might erupt unforeseen?" [InsureCo1, i/v 7]

Arguments about responsibility could at times slow down intervention, an issue with a structurally ambidextrous approach under conditions of high uncertainty.

'Focus'

The third archetype for dealing with critical incidents is to 'Focus' on key responses (although without extra capacity) to deal with shocks characterised by uncertainty. This is more akin to the concept of contextual ambidexterity, although with a nuanced movement to a more exploratory mode under conditions of difficulty. For instance, ElectricityCo exhibited a relatively high degree of contextual ambidexterity (albeit with an emphasis on exploitation) during times of 'normal' operations. Managers could operate outside their usual routines when faced with shocks (e.g. mechanical failure in the power plant) by deploying appropriate, flexible responses. Compliance with rules and procedures was mandated as this was a hazardous environment, but managers were also explicitly authorised and skilled to deal with novel and emerging situations.

> "People who can recognise risk and apportion the correct risk to an incident, they can look beyond the obvious, they can see it's maybe minor but this could escalate. They're good at risk assessment and there are some of the guys who you wouldn't want in that role because they would turn everything into a major disaster, there are some people who you give them a matchbox that was on fire on their desk and they'd be evacuating the site… When I was

> training, when I was early in my days as shift manager it was an unwritten rule that you went through the emergency procedures in readiness, when you got the process supervisor job one of the questions that you were asked regularly was: 'Are you familiar with the emergency procedures?' It's being prepared for the unexpected, getting yourself ready for disaster planning, you need to plan, if you plan for the disasters then you are ready if something happens." [ElectricityCo i/v 9]

Serious issues are both emergent and rehearsed, an example of exploitation and exploration:

> "We do refresher training for the incident controllers… so in the training they will do a desktop exercise, they will go through some of these procedures and so they'll get people in some ways to pitch themselves into what their actions are going to be, as opposed to 'I'll go there and I'll panic', because it's no good having lots of people, lots of skills… because you need lots of things covered. We need the fire people, people who will put the flames out, the incident controller, we've got first aiders as well so everybody's got their own [skills] and they need to be proficient in that role. And they need to be able to carry out that role without recourse to senior management or supervisors etc. because they've got to be able to act independently at a time of a major incident. You haven't got time to be telling people what their role is, you need to be prepared." [ElectricityCo i/v 8]

The challenge under these circumstances, though, is that individuals must deal with both normality and abnormality simultaneously. In most of the researched incidents, managers paid attention primarily to the important unfolding events, focusing their attention on the exploratory aspects, often at the expense of the unaffected systems that still required their attention. Others struggled to let go of the expectation of 'normality'. Although suitable, flexible, responses were implemented to deal with the incidents quickly, the balancing of both exploitative and exploratory responses simultaneously was noted by the interviewees to be mentally demanding, some even describing 'mental overload'. Ambidexterity with the requirement for high levels of both exploitative and exploratory activity can therefore reduce the effectiveness of the solutions being attempted or lead to one mode being supported at the expense of the other.

'Flexibility'

The fourth archetypal response is ‘Flexibility’. This is where managers exhibited contextual ambidexterity, but with the consistent emphasis on flexible, exploratory, solutions with only limited rules to constrain the options. Managers were relatively ‘free’ to develop their own ways of working and this was associated with their environment being separated from the wider system of the organization, with relatively ‘light’ governance and control.

> “I suppose the fact that we are ‘process-light’ means that you have to work a lot of things out. We’re a company of problem-solvers. That’s not just technical side, as you learn and recognise issues and then you recognise how you recognise those issues, and it’s because there’s no easy answer of saying ‘Well I’ll go to page 13 in the process manual and this is what I do next.’ You have to think.” [ProdDevCo i/v 3]

Managers tried hard to ingrain this within the organization, and to prevent complacency:

> “So this is very positive because again, this is difficult, this is not traditional. If you maintain a high state of alertness and you overcome the problem of complacency and down-playing things, you say, well, if everything happened perfectly in the past why should something go wrong right now? And you make sure that you know you prepare yourself or the organization to be adaptable and flexible and then how you exercise this flexibility. We don’t see this in many organizations, because it is usually traditional, it is more like it is driven by hierarchy. The issue is also when you look at improvisation, often when younger people come in, inexperienced people come in, then there is usually a tendency, ‘Oh I’ll give you a body of knowledge, you just follow process and you are fine’, which doesn’t really tell them about a key skill of improvisation.” [ProdDevCo, i/v 1]

This mode was prevalent in ProdDevCo, in the development of medical devices, sensor technologies and communications systems. Its managers used predominantly exploratory practices. Once a particular critical incident, such as a major setback in a test environment, had been identified and shared, it was accepted that no ‘standard’ operating procedure was suitable for responding. Compliance to protocol was replaced by managers engaging with stakeholders in a discourse of how best to understand the problem and how to solve it effectively. However, in contrast to the other cases, uncertainty was not actively avoided but viewed as an opportunity for innovation. Hence, critical incidents were perceived as opportunities to learn and improve.

> "You're given a lot of responsibility, but you're also given a lot of freedom. I think the way we put it, we only employ people who will lay awake at night worrying, you don't need a manager then, the point being - and this is, I suppose, quite endemic to [us] - you don't have managers necessarily telling you on a daily basis what to do. Each person decides themselves what needs to be done, and we're all intelligent people, we have our own conscience, we don't need other people to come and tell us that we're doing things right or wrong." [ProdDevCo, i/v 4]

'Rescue'

Finally, in some incidents, shocks caused managers to 'abandon' exploitative rules and deploy an extreme exploratory approach to the situation. In these cases of 'Rescue', a clear switch from exploitative to exploratory ways of working was driven by the disturbance and was associated with the perception of intense pressure. In this archetype, governance frameworks were seemingly dismissed, replaced by ad-hoc practices for the recovery period. Whereas other modes demonstrate balance between exploitation and exploration, together with an underlying logic, these examples exhibited a significant swing from one mode to its polar opposite. They were viewed by their participants as extremely stressful and to be avoided if at all possible. In one example, an unrealistic expectation caused chaotic working from the outset:

> "When I joined the account I was asking for copies of schedules for a piece of work, and just got a shrug, you know, it was terrible, terrible really. The schedules take time, they should be what drives the resource and the cost and the timelines and everything else, and the risks and they've got the built-in quality. There's all these good things so that we end up with a system that they'll be proud of that will last them, and it will work and we've got the means of monitoring how it's working, you know, some metrics and monitoring tools and everything. That should all be in there, and yet what they've done is they've perhaps asked for a guide price, we've given it plus or minus 40%. They ignore that, they go for the middle bit, they go and get scheme approval for that, tell us what to do and we spend the first month trying to work out what it is, and they're saying, 'Well, you know, you've had a month now and you've already slipped a month in the schedule because the schedule says start delivering". And you're on your back foot from there trying to run furiously to catch up." [EngineCo, i/v 5]

These kinds of issues can have dramatic effects on the staff:

> "How does it feel for me personally? Well, I mean, I'm diabetic, and since I've been on this account, I've now got angina. So I was diagnosed with angina about the Christmas I was having the stressful times with [name]. So I have to be carefully, personally, what I'm doing in stressful situations. It is very stressful. It's got better since I had an account manager assigned to me to share the burden in the last nine months. It's got better since we finally got the first tier architecture off everybody's back and into some sort of shape. But it's absolutely hell on earth." [EngineCo, i/v 10]

These effects are summarised in Table 3, showing how each of these modes can be considered in terms of exploitation / exploration and also the positive and negative effects on resilience.

Response Archetype	Ambidexterity orientation	Impact on resilience
Rule-based	Primarily exploitative and remaining so during and after an incident.	[+] Stable, transparent, relatively straightforward. Appropriate when risks can be predicted in advance. [-] Difficult to respond to new and unexpected challenges. Inflexibility.
Resourcing	Moving from an exploitative mode to one of structural ambidexterity (i.e. exploitation and exploration both supported).	[+] Allows additional expert resource to be added to a situation. Aids flexibility to resolve the new issue while also supporting ongoing operations. [-] Clear lines of responsibility difficult to establish, may cause overlap and potential confusion.
Focus	Contextual ambidexterity, moving from an emphasis on exploitation to one of exploration.	[+] Local autonomy to deal rapidly with an emerging situation and take actions deemed appropriate. [-] May lead to 'overload' and/or a focus on the crisis, potentially neglecting ongoing operations.
Flexibility	Primarily an exploratory mode to give flexibility.	[+] Supports flexible, exploratory, solutions with only limited rules to constrain options. [-] Stressful for some participants, can be considered inefficient and 'expensive' compared to 'traditional' techniques.
Recovery	Temporal ambidexterity moving from an exploitative mode to one of exploration.	[+] Rapid response to a crisis to use solutions deemed appropriate in the moment. [-] Chaotic, represents a failure of existing management systems.

Table 3: Five response archetypes and their relationship with ambidexterity and resilience

Discussion

In this paper we sought to investigate what managers do to achieve resilience, and used an ambidexterity lens to understand this better. As a result of an uncertain environment, managers develop a set of contextually-specific actions, and these we identified from five cases via the Gioia method (Figure 2). We identified three aggregate dimensions of 'Preparing', 'Noticing and Interpreting' and 'Determining Potential Responses', yet the coding within each of these categories showed a complex mix of activities. The use of parallel-coding revealed these facets were not mutually exclusive and do not necessarily represent a purely linear, ordered, progression, but could overlap and co-exist, revealing still further nuances. This introduces greater richness to key ideas presented by previous authors. Specifically, we have shown the importance and complex interactions of the multiple organizational parts that Kahn et al. (2018) identify. By using Burnard et al.'s (2018, p.352) definition of resilience as "the ability to anticipate, avoid, and adjust to disruptions and changes", we have built on Williams et al.'s (2017) acts of 'preparing' and 'restoring'. The dimensions and corresponding sub-themes in Figure 2 unpack the intricacies of 'what managers do' in greater detail.

Interestingly, definitive 'outcome' discussions were less prevalent than we expected, with respondents often articulating an ongoing stream of challenges within their work rather than bounded issues. The data did not show that critical incidents were (1) linear, or (2) independent, with managers more likely to report simultaneous actual and potential incidents. Ackoff offers insight on this 'messy' environment:

> "Because messes are systems of problems, the sum of the optimal solutions to each component problem taken separately is *not* an optimal solution to the mess… Managers do not solve problems; they manage messes [emphasis in original]." (Ackoff 1979, p.100)

The cases we studied showed multiple co-existing stimuli. The complexity caused by the interaction of these stimuli leads to complex patterns of responses, and a simple model is not sufficient. We note the similarity here to Hussenot and Missonier's (2016) 'prehension', and the interaction of past, present and anticipated events. This level of temporal complexity was unanticipated and further shows the challenge of understanding the nature of managerial resilience. As one manager put it succinctly:

> "Yes, that is just the stuff that happens in insurance companies, the rain falls, floods happen, we have to respond." [InsureCo1 i/v 12]

This is indicated in the representation of Figure 4. Incident A will unfold over time, yet incidents B and C also occur in due course. 'Preparation' includes learning from previous events, as identified in Figure 2, yet managers know from experience that if they are dealing with A and becoming aware of B and C, an as-yet unknown D may well occur too. Practical responses must account for all of these.

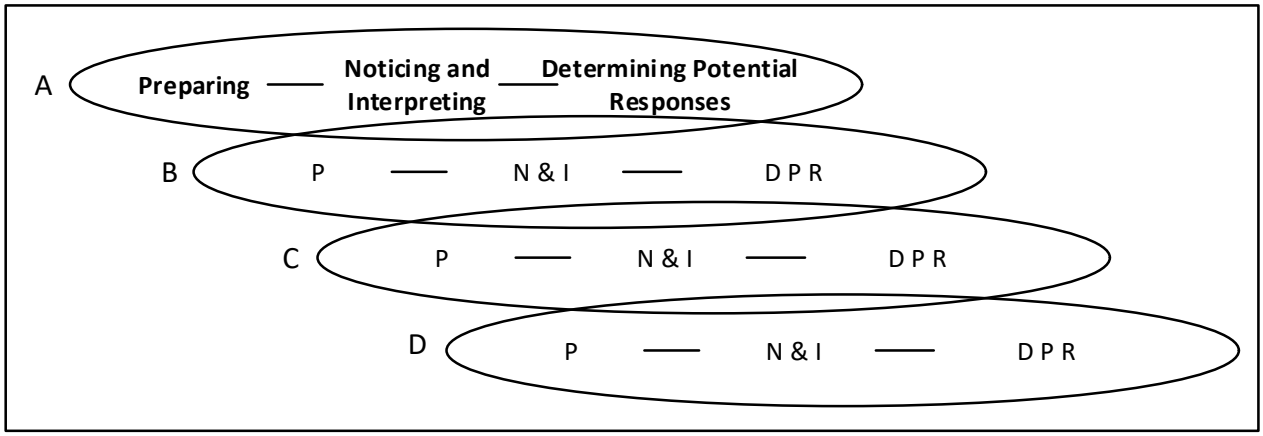

Figure 4: The overlapping nature of resilience with multiple incidents (based on Hussenot & Missonier, 2016)

What does this mean for our understanding of resilience? Resilience comes not from repeatable patterns of *stimulus-response*, but from the combination (weaving) of *Preparation – Noticing and Interpreting - Determining Potential Responses* in the moment. This requires managerial judgement, drawing on exploitative and exploratory actions as necessary under the particular circumstances.

Exploitation and exploration permeate Figure 2. The presence of both indicates ambidexterity, but it is not a 'simple' picture. One might expect the preparing phase to be more exploratory, then exploited as necessary at a future point in time, but this was not evident.

There is no single, clear feedback path. Actions to capture and disseminate findings are integral parts of ongoing operations. Although codification through documentation is used, many of the actions are contextual and social, and this is important in understanding how teams and organizations function in reality.

Our data also show a more comprehensive picture of how we can understand contextual ambidexterity actions (Gibson & Birkinshaw 2004) with regards to resilience. By considering the (broadly) cyclical nature of the three aggregate dimensions identified (albeit with overlaps and co-existences), learning gained can be used in the next cycle (i.e. responses give insight that can feed future preparation, and so on), in line with Burnard and Bhamra (2011) and Vargo and Seville (2011). We illustrated how this contextual ambidexterity may be understood as an evolving combination of exploitation and exploration. This temporal analysis shows how resilience can be built through a combination of past-informed learning and present-informed interpretation and analysis. These dynamics are far more intricate than the previous high-level approaches to ambidexterity, and represent the co-existence and interweaving of multiple actions over time. The case organizations did not operate at a single static point 'balancing' exploitation and exploration, but at multiple points (including the 'zero', i.e. failure to do either effectively) which changed over time. These dynamics may offer a new way to conceptualise the manifestation of exploitation and exploration in response to unfolding events, to understand better 'what managers do'.

Despite the differences in the contexts of the organizations, the aggregate dimensions were identified in each, indicating that they may be valid beyond the research cases. The ambidexterity lens proved useful when examining response options, as these ranged from primarily exploitative ('Rule-based') to the predominantly exploratory ('Flexibility'). The variations incorporated temporal, structural and contextual ambidexterity, as indicated in Table 3, and include the reconfiguration of resources, in line with Ambulkar et al. (2015). Responses are conditioned, to some extent, by organizational culture and social attributes (as highlighted in the literature and supported by the case data), yet are also reliant upon on management judgement, the particular context, and the level of uncertainty. No generic, 'standardised', approach is achievable.

Conclusion

Our purpose with this paper was to gain insight into how managers perceive that they achieve resilience within their organizations, responding to the call from van der Vegt et al. (2015) and examining our data with the lens of exploitation and exploration. We addressed the research question 'What do managers do to support resilience?'

Our contributions are as follows. First, using the Gioia method, we identified the details of the enabling actions underpinning resilience (namely 'Preparing', 'Noticing and Interpreting' and 'Determining Potential Responses'). The aggregate dimensions were consistent among the five cases in terms of resisting a disturbance. These each contain multiple concepts, showing that resilience is both complex and situation-specific, and that they are not stand-alone but are interwoven. Exploitation and exploration are inherent in these ideas, and require both in-the-moment judgement and also a longer-term perspective in building a culture which supports this capability. The exploitation / exploration conditions vary over time, and this offers a new way of conceptualising both practical, dynamic, ambidexterity, as well as resilience.

Second, we identified five archetypal responses to incidents. Ambidexterity (temporal, structural, and contextual) is indeed apparent in the data when considering the responses identified, and the balancing of exploitation and exploration is central to managerial practice, thereby demonstrating the utility of the lens we chose. This implies that the enabling actions (Preparing, Noticing and Interpreting, and Determining Potential Responses) appear common in the cases studied (including the simultaneity of enabling and responding), yet can result in different ways of responding when disruption occurs. This is an interesting finding that we did not anticipate at the outset. The ongoing day-to-day actions can be understood as incorporating both exploitative and exploratory activities, but the response types in Figure 3 have a more clear-cut focus on exploitation and/or exploration and the dynamics of these over time. The environments within these organizations facilitate ambidexterity and this in turn supports the creation of a particular response.

Third, the development of resilience over time via learning takes place via multiple mechanisms, including codification, as well as through actions shaped by social and organizational cultural factors. The data showed that incidents being faced were often overlapping in nature rather than discrete, and we draw on the arguments of Hussenot and Missonier (2016) to look at responses in conjunction with previous history and future expectations. This highlights how exploitative and exploratory actions are contextual and situated, and built on social and personal experiences, further indicating how 'one-size-fits-all' is not realistic. This is an aspect of time-dependence that was unexpected, but it adds to our understanding. We believe this is a valuable area to explore further.

We note that resilience is not necessarily a state or single point that can be achieved once and for all, organizational reality is too complex for that to be viable. We have highlighted the overlapping nature of incidents and therefore the limitations of a 'stimulus-response' model in the cases we studied. This 'localised' resilience can be explained in terms of the actions we identified, and these can be viewed in terms of exploitation and exploration. This does suggest that managers would benefit from turning what we have observed as 'resilience by default' into 'resilience on purpose' – in other words, the understanding provides a basic framework for managers to design their practices purposefully to make them more resilient. We have used this on executive education courses and with executive MSc cohorts (including a range of industries, and both the private and public sectors) to prompt discussion and reflection. Often the nature of resilience and how their actions may contribute to it has not been an area they have directly addressed before, and the conversation enables opportunities to be explored. This often involves considering what the 'ideal state' might look like for their particular part of the organization, and recognising the challenges that may need to be overcome. A common response is that the 'rule-based' archetype is prevalent and participants highlight the need to foster more exploration within their day-to-day activities, but organizational processes are regularly held up as barriers. In some instances, the reverse has been the case and the need for greater control and governance has been voiced. Feedback from these sessions is that managers gain useful insight into their operations by considering these ideas and subsequently working through them with their teams. Figure 3 is a beneficial aid to frame those discussions and consider what practical changes may be implemented.

It would be valuable for further studies to take a longitudinal approach to data-gathering so that the unfolding events can be studied with less chance of recollection bias. A specific multi-level approach may also give more detailed insight, as might a focus on the role of improvisation. The organizations were also deemed by their participants to be successful, and it would therefore appear to be valuable to understand the operation of unsuccessful work as a comparison. We note that, given the level of analysis here, perceived success cannot necessarily be translated to organizational-level resilience, and the link between localised and organizational resilience (as indicated in Figure 1) would appear to be an important area to explore further.

To conclude, we have shown that ambidexterity is a valuable lens through which to investigate managerial actions perceived to lead to increased 'localised' resilience. In particular, it has enabled us to understand exactly which actions managers take in terms of exploitation and exploration. We hope

that these initial findings can provide a platform from which to expand our knowledge, with both qualitative and quantitative data, to enhance our understanding.

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